

## DRIPLESS PAPER CUP

### FIELD OF THE INVENTION

This invention relates to a cup made of any one of paper, foam, plastic foam and particularly to a paper cup that does avoids dripping liquid contents of the cup from leaking from the cup onto the user.

### BACKGROUND AND INFORMATION DISCLOSURE

Paper cups are used to hold beverages—coffee, soft drinks, etc. to be ultimately drunk by a user. The cup is typically a paper sheet bent into a cylinder to where two opposite edges of the sheet are glued together. The overlap union of the edges forms a seam that extends from the lip to the bottom of the cup. The lip of the cup is then rolled to form a rim around the lip of the cup that reinforces the rim. It is characteristic of this construction of the cup that the overlap of edges forming a seam inadvertently forms a lump or step in the ring at the end of the seam.

Such cups, dispensed from fast food stores and coffee shops, are often provided with a plastic cap that snaps around and onto the rim at the lip of the cup to prevent spillage particularly when the cup is being transported, e.g., in an automobile. In some versions, the cap has a “drinking” hole near the edge of the cap (the hole being about  $\frac{1}{4}$  inch diameter) whereby the user is able to drink the contents through the

"drinking" hole with reduced incidence of spillage when he is otherwise engaged such as riding in an automobile.

However, the cup with cap is not a perfect solution to the problem. The presence of the lump or step in the rim at the seam results in a small opening of gap between lip and cap. When the cap is placed onto the cup at an orientation of the cap where the drinking hole is close to the seam, liquid leaks out unbeknown to the user when he drinks through the hole in the cap and the leakage drips onto the users clothing, etc., especially if the liquid is hot

#### SUMMARY OF THE INVENTION:

It is an object of this invention to provide a cup with cap that avoids the problem of leakage associated with the opening between lip and cap due to the presence of the lump or step in the rim of the cup formed by the seam.

This invention is directed toward construction of a cup that has no sharp lump or step in the rim forming the lip in the cup that would otherwise result in an opening between the lip and a cap snapped onto the lip.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A, B and C show a cup of the prior art.

Fig. 2 is a sectional cutaway view of a cup with feathered edge.

Fig. 3 shows a cup with a second ring.

Figs. 4A, B, C, D, E show the cup with cutouts in the sheet positioned to reduce/eliminate the step or lump.

Fig. 5A shows a cup with compliant gasket.

Fig. 5B shows a piece of sponge adjacent the gap.

Fig. 5C shows a sponge ring around the cup near the rim.

Fig. 5D is a sectional view showing the sponge under the rim of the cup with a hole in the rim.

Fig. 5E is a sectional view showing the sponge under the skirt of the cap.

Figs. 6A, B show a cup with markings to orient the cap diametrically opposite the seam in the cup.

Fig. 7 shows the cup and cap with an egg shape.

Fig. 8 shows the cup with a secondary sleeve that engages the overlying surface of the cap.

Fig. 9 shows the cup with a flattened rim that engages the flat mounting surface of the cup thereby avoiding the formation of an aperture.

Fig. 10 shows the reverse curve for snapping cup onto the rim in only one orientation.

Fig. 11A, B show feathered edges of the paper for forming the cup.

Fig. 12A, B show the lump or step reduced by suitable means such as abrasion, pounding the lump or step, or applying filler to the step.

Fig. 13 shows the rim of the cap with a thread for engaging the threaded rim of the cup with a block in each thread positioned to align the drinking aperture in the cap positioned diametrically opposite the step in the cup when the cap is screwed onto the cup.

Fig. 14 shows an embodiment in which the rim of the cap has a convoluted extension.

Fig. 15 shows an embodiment in which a band around the cup is flared.

#### DESCRIPTION OF BEST MODES FOR CARRYING OUT THE INVENTION.

Turning now to a discussion of the drawings, figs. 1A shows a cup 10 of the prior art. Fig. 1B shows a sheet 12 (e.g., paper, plastic foam) ) for forming the cup of fig. 1A. The sheet 12 is bent to form a truncated cone (tapered cylinder) by joining the two opposite edges 14A, B of the sheet 12. One edge 14A overlaps the other edge 14B and the edges are secured together by glue to form a seam 22. A bottom edge of the truncated cone is joined to a paper disk (not shown) forming the bottom of the cup. The top edge of the truncated cone is rolled to form a firm lip 18. A step or sharp lump 20 is inadvertently formed in the lip 18 because of the double layer of paper forming the seam 22 in the cup 10


A cap 24 is poised for snapping onto the lip 18 of the cup 10. The cap 24 has a hole 26 near the edge of the cup enabling a user to drink the contents of the cup 10 through the hole 26.

However, as shown in the cutaway view, fig. 1C, when the cap 24 is snapped onto the lip 18 of the cup 10, the step or lump 20 causes a gap 30 to occur between the meeting surfaces of the cap 24 and the lip 18.

When the cap 24 is snapped onto the lip 18 such that the gap 30 is close to the hole 26 (rather than distal from the hole 26) in the cap 24, then leakage occurs through the gap 30 when the user drinks through the hole 26.

There are several embodiments of this invention that provide a cup in which leakage of the liquid through a gap between cap and lip is avoided.

Fig. 2 is a sectional view showing one embodiment, in which a paper or polyethylene strip 32 straddles and is secured to the lip 18 of the cup 10. The strip is secured by glue, caulk or non-toxic sealant or any safe material to seal the gap and selected to withstand the heat of a hot drink. The edges 34 of the strip 32 extend beyond both ends of the lump or step 20. The edges 34 of the strip 32 are "feathered" or has a trapezoidal shape so that there is no abrupt step in the rim forming the lip 18 and the cap 24 has sufficient compliance so that the cap 24 forms a tight seal along the entire length of the strip 32. The strip 32 may have a trapezoidal shape providing that, when the strip is wrapped around the rim, any lump has a gradual slope on each end that



mitigates against formation of an abrupt step that results in a gap between cap and cup when the cap is mounted on the cup.

Fig. 3 is a sectional view showing another embodiment in which a secondary ring 36 (preferably injected molded or elastomeric material so that it has no seam) is securely sealed onto the lip 18 thereby forming a secondary lip that has no lump or step .

A cap 24 snapped onto this secondary lip would not engage any lump that would otherwise create a gap.

Figs. 4 A,B show another embodiment in which a shoulder 38 is cut in a corner of the sheet 12. The edges 14 A and 14B are joined forming the cup 10. Fig. 4 C is a sectional view showing the lip 18 of the cup 10 wrapped around a short rod 41 of plastic, sponge, paper or other material, not shown thereby avoiding overlap to form a lump at the end of the seam in cup 10. The seam and joint is sealed with a non-toxic caulk, glue or sealant when necessary to avoid gap formation.

Fig. 4D shows an alternative arrangement in which one edge 14 D has a cut 53 arranged to permit rolling the edge 14D into a smaller diameter than rolled edge 14E. As shown in fig. 4E., when edge 14E is rolled over rolled edge 14D, the step is minimized or eliminated.

Fig. 5A is an exploded view of another version in which a compliant gasket 42 is securely mounted on the inner rim of the cap 24 where the cup and cap meet each other. The gasket 42 is made of elastomeric material so that it conforms to the lip 18 providing that openings between lip and cap occurring without the gasket are avoided.

In one embodiment, the gasket comprises a compliant sponge.

Figs. 5B,B show another embodiment in which a sponge 51 is mounted on the cup close to the lip 18 so that any leakage through the aperture will be retained by the sponge 51. In the version (fig. 5B) the sponge 51A is a short section glued to the cup 10. In another version, (fig. 5C) the sponge 51B is a ring (or band) that encircles the cup close to the lip 18.

Fig. 5D is a sectional cutaway view showing another embodiment including a small hole 52. The hole 52 is located in the seam 22 through the lip 18 and communicates with the suitable absorbing material such as sponge paper, cloth, etc. Beverage will leak out through the hole 52 and be absorbed by the sponge 51A "stealing" any beverage that would otherwise leak at the step 20. It will be understood that "sponge" is an appropriate absorbing material.

Fig. 5E shows the sponge (suitable absorbing material such as sponge, 25 paper, cloth, etc) under lip 18 of cup 10 between the side of the cup 10 and skirt 24 of cap 24. Cup 10 and cap 24 are shown away in figs. 3E,

In another embodiment, colored markings and indicia on the cup and cap warn the user not to position the hole in the cap adjacent the seam in the lip. A number of versions of warning are contemplated. Fig. 6A shows one version being a simple statement on the cap, "DON'T BE A DRIP" and statement on the cup, "LINE UP THE STRIP" with alignment marks 31 on both cap and cup. The habitual coffee-drinking user will soon learn to follow the direction and orient the cap on the cup such as to avoid aligning the lump 20 with the hole 26 in the cup 10.

Fig. 6B shows another version in which an outline of a hand 11 is imprinted on the cup 10 opposite the seam so that when the cup is tilted as the user drinks. The beverage flows away from the seam.

Fig. 7 is a top view of another version of the cup in which the rim 18 of the cup 10 is not a circle but rather is egg shaped. The cap 24 is also egg shaped so that the cap will snap onto the rim 18 of the cup 10 in only one orientation. In this orientation, the hole 26 is diametrically oppositely positioned distal from the lump 20 so that the user can drink from the hole in the cap without leakage through the opening formed by the lump 20.



Fig. 8 shows another version in which a sleeve 50 is poised for inserting into the cup 10. The cap (not shown) fits snugly into the sleeve thereby avoiding leakage through any gap that is otherwise formed by the seam in the rim of the cup.

Fig. 9 shows the lump 20 has been flattened out. The surface 25 of the cap 24 engaging the rim 18 is also flat so that a gap at location 30 does not form at the interface of the cap and rim of the cup.

Fig. 10 is a sectional view showing the lip of the cap 24 having a reverse curve 50A poised to interface with the rim 18A of the cup 10. The reverse curve 50A provides that the cap will "snap" down over lip 18 of the cup 10 so that the cap 24 is secured to the cup. It is an embodiment of this invention that the thickness of the rim 18 at location 18B of the cup is greater than the thickness of the lip 18A on the diametrically opposite side. The reverse curve 50B of the cap 24 is accordingly greater on one edge of the cap than reverse curve 18A at the opposite location. This provides that the cap 24 will sit with only one orientation on the cup 10 with the hole on the cap diametrically opposite the seam in the cup.

The radii of the convex surface mating with the concave surface are selected to apply sufficient force between the surfaces to level (fill) the triangular opening caused by the step.

Fig. 11A, shows an edge of the paper forming the cup before (fig. 11A) and after (fig. 11B) the seam 14 is formed. The edges 14A and 14B are feathered so that the thickness of the lip 18 is uniform at the seam as shown in fig. 11`B. Therefore, when the edge of fig. 11B is rolled, no step or sharp lump will be formed.

There have been described several versions of an invention to avoid spillage that otherwise occurs due to the formation of a gap between the lip of a cup and a cap snapped onto the lip of the cup due to the presence of the step at the rim of the paper cup. An object of the invention is to remove the step or lump occurring at the seam of the cup or to promote mounting the cap onto the cup oriented to where the hole in the cup is not adjacent to the lump on the rim. Variations of the invention may be contemplated after reading the specification and studying the drawings, which are within the scope of the invention.

For example, fig. 12A shows that the step or sharp lump 20 has been removed by any one of :

abrading the lip or cutting the step or lump away with a suitable tool

pounding or forcing the upper level of the step down to where the upper level is planar with the lower level of the step;

pounding or forcing the lower level of the step up to where the upper level is planar with the lower level of the step.

sealing, filling and feathering the triangular opening caused by the step 20 with the a suitable waterproofing material such as paper, caulk, glue, elastomeric material as shown in fig. 12B.

Fig. 13 illustrates another version for preventing alignment of the step (or lump) formed at the seam in the rim of the cup and the drinking aperture in the cap near the rim of the cap. In this version, the rim 19 of the cap 24 has a thread 45 that engages a thread 47 on the rim 18 of the cup 10 by twisting the cap onto the rim in a manner well known in the art. The thread 45 in the cap 24 and the thread 47 in the cup 10 each have a block 43 so that when the cap 24 is screwed onto the cup 10, the cap will screw onto the cup only until the two blocks, 45 and 43, meet. The cap and cup are constructed so that the two blocks meet when the aperture in the cap is located at a position that is remote (preferably diametrically opposed) to the position of the step in the cup.

Fig. 14 is a sectional view showing another embodiment in which the rim 24B of the cap 24 has a convouted extension 24C which captures leakage 25 that would otherwise spill onto the user

Fig. 15 is a perspective view showing a band 64 around the cup 10 with an edge 66 adjacent the rim of the cup 10 flared away from the cup 10 to absorb or redirect leaking beverage away from the drinker.

In view of these variations, I therefore wish to define my invention by the appended claims.